

FOREST MANAGEMENT UPDATE

Number: 14

Date: September 1992



Where will an Old Forester sit? . . .

In this issue:

- Forest Stewardship: Upcoming Challenges
- Ohio's Forest Stewardship Program
- Sugar Maples Are Not Dying
- Selling Less for More
- Forestland Grazing and Water Quality
- Without Conservation Education....?
- Managing Red Oak Crop Trees to Produce Financial Benefits



NORTHEASTERN AREA
State and Private Forestry



Forest Stewardship: Upcoming Challenges

by Arlyn W. Perkey

During the past several months, implementers of the Forest Stewardship Program have been busy establishing state stewardship committees, developing implementation plans, writing standards for incentive practices, and preparing landowner stewardship plans. These essential tasks formed the foundation of the Forest Stewardship Program in each state. Recent reviews revealed that many state stewardship committees are interested in revising their implementation plans. As a part of this process, it is appropriate to examine some of the challenging forest stewardship issues that confront land managers in the 20 northeastern states. The following topical discussions are intended to provide food for thought and, hopefully, stimulate further action in states where these issues are relevant. These four challenges are certainly not the only stewardship issues we face, but I feel they are appropriate for stewardship committees to confront. There is an opportunity for us to make a difference.

The Effect of an Urbanizing America on Rural Forest Resources

The United States is urbanizing. The Urban and Community Forestry Program is being developed to deal with the urban forestry issues that have arisen. However, we need to address the effect of a largely urban population on forest stewardship in rural America. Some of these issues are already being addressed as a result of initial stewardship planning; however, the following are examples of things to consider when fine-tuning forest stewardship implementation plans:

** Landowner Awareness*

The intent of the Forest Stewardship Program is to reach landowners who are not actively managing their land. Many of our potential new clients are absentee landowners who live in an urban area. Our



Many new clients are absentee landowners who live in urban areas and visit their rural properties when they have leisure time. This informed forest steward is trading her tennis shoes for hiking boots so she can comfortably enjoy her woods.

traditional landowner contact mechanism is through the agricultural community. Are our stewardship information outreach programs designed to contact this urban audience? Is the delivered message one that will encourage them to plan and practice forest stewardship with continuity? The majority of our potential clients are unaware of, or indifferent to, the need to continually manage their forest resource to provide benefits for them and future generations. We still commonly find landowners whose first experience with management is an inadequately planned and supervised timber sale that ends with disappointing results. We must try to reach potential clients with the stewardship message before that happens.

and regulation of hunting activities. Our performance as an environmental force influencing habitat and hunting has improved during this century. In the past we destroyed whole ecosystems (plowing and draining the tall grass prairie) and hunted wildlife to extinction (the passenger pigeon). We are now at least aware of the influence we can have on the environment, and we no longer view our forest resources as inexhaustible. We don't *cut-out* and *get-out*; nor do we allow wildfire to burn rampantly anymore without attempting to control it. This does not mean our present management of the landscape is beyond reproach, but we do need to recognize that we have taken some positive steps forward.

Management of the whitetail deer herd in the eastern United States is clearly an example of an animal population/vegetative community situation that deserves the attention of forest stewards. In several areas, we have gone from near-extinction populations to deer numbers that are so high they are altering the habitat in which they live. Deer browsing of preferred species is affecting the frequency of occurrence of those species. In local areas, deer may be a major factor causing plant extinction. How frequently this happens is not known. The public needs to be aware that overpopulation of deer probably has effects that go beyond the obvious visible damage to a farmer's crops or failed regeneration of a forester's desirable trees. Excessive numbers of deer may eliminate or greatly reduce the frequency of occurrence of a wide range of herbaceous and woody vegetation. It isn't easy to get the public concerned about the effect Bambi may be having on rare, threatened, and endangered plant species. How could anything as endearing as a cute little fawn possibly grow into an agent of destruction?

The appropriate size of the deer herd is often now a biopolitical, value-driven issue. Several groups want to influence the management of the deer herd so it will be consistent with their own values and

objectives. Examples of these groups and political factions include farmers, forestland owners and managers, foresters, hunters, nature watchers, and wildlife biologists. Various public agencies are crucially involved because of their officially delegated management responsibilities related to controlling the size of the deer herd or the management of their habitat. It is interesting that leaders of the primary environmental organizations have remained silent on this vital issue.

This issue has no simple solution. It must be addressed on a local basis because of the many political, social, and resource variables involved. For example, it is seldom feasible to establish an appropriate target population level for a broad political area. The number of deer a landscape can handle without sustaining significant damage to vegetative communities depends on the habitat available. Generally, a mixed farm and forest landscape can support a larger population than a solid forest can. A forest with a diversity of forest stand age classes can support a larger population than an old growth forest can. There is no static *right answer* to the question: *How many deer is too many?* It depends not only on the habitat on the landscape at the present time, but also on how landowners may decide to manage the forest resources of the area in the future. If landowners in a political area choose the creation of quality deer habitat as a management objective and implement practices to accomplish that goal, the environmentally and socially acceptable deer population could be higher than that of an unmanaged landscape.



This landowner is frustrated by deer damage to plants near her house. Forest stewards are concerned about the effect of high deer populations on plants in the forest.

There may be some opportunities to take remedial action to reduce the impact of exotic species. For example, it may be desirable to seek approval for cost-share practices designed to minimize the impact of pests. A gypsy moth control cost-share practice would be a classic example of this type of effort. An example of a less-direct action would be the inventory of live American Chestnut trees larger than 10 inches dbh. This inventory could provide information on available seed sources of American Chestnut. If we are ever able to do restoration work with the American Chestnut, the availability of a genetically varied seed source may be critical.

Reforestation of Reclaimed Mine Lands

Although there are many acres of land in the Northeast that are grossly underutilized in terms of producing benefits, there is one category of land that deserves special attention. That is reclaimed mine lands that are currently covered with grass. In many instances, these lands were successfully seeded only by applying significant quantities of lime and fertilizer. They are still very fragile sites, and as the lime and fertilizer are leached away, they may again be subject to erosion. Even if the soils are stable, many of these lands could produce more economic, aesthetic, and wildlife benefits if they were forested. As the demand increases to produce more benefits from our forests, the anticipated needs of future generations preclude us from leaving once-productive lands lie idle.

Frequently, these lands are a challenge to reforest because of factors like soil compaction and low pH. Consequently, owners of reclaimed mine land may need more specialized technical assistance than most non-industrial private landowners. The Forest Stewardship Program can be a mechanism that facilitates providing that assistance. For example, in Ohio's Stewardship Implementation Plan, the need for a reclamation forester for an 18-county area in eastern Ohio was recognized. To meet this need, concerned people from four entities worked together to accomplish mutual objectives. The Ohio Division of Forestry, the Muskingum Watershed Conservancy District, the Crossroads Resource Conservation & Development Area, and the Buckeye Hills Resource Conservation & Development Area combined financial resources to hire a forester to provide this specialized technical assistance. This is an excellent example of stewardship partners working together to address a stewardship issue.

Like all human endeavors, the movement to help landowners become better forest stewards requires leadership. In this movement, that leadership responsibility rests with the State Forester who is advised by a State Stewardship Coordinating Committee. Frequently, leadership is by example. If we, the natural resource community, expect landowners to be good forest stewards, we must set a good example and show our commitment to the ethic. We can set that example by tackling some of these challenging stewardship issues.



This American Chestnut planted in Iowa is out of the normal range of the species, and it has not succumbed to the blight. These scattered remnants may provide an important genetically varied seed source for future restoration efforts.



Bossy the Cow is NO forest steward! Woodland grazing has been identified by the Soil Conservation Service as the #1 erosion problem in southeastern Ohio.



Trees are playing a vital role in northwest Ohio's farming community.

During the last two years, the Stewardship Program has provided the funding to enable the Division of Forestry to complete numerous projects that enhance and support the message of good forest management to private woodland owners. The Stewardship Committee has targeted three areas within the state for special projects. First, the southeastern counties have been identified as having a serious need for woodland fencing projects. The SCS has reported a severe erosion problem in this area because of grazed woodlots. The second target area is northwestern Ohio, where wind erosion is a serious problem. The planting of windbreaks has been identified as priority in that portion of the state. The final target area is the Big Darby Watershed located in central Ohio. The Ohio Nature Conservancy has declared Big Darby Creek as unique in its diversity of flora and fauna.

With the three target areas in mind, the Stewardship Committee developed numerous projects to help address these issues. Listed below are some of the projects completed.

- * Demo Area for the Windbreak Program - a demonstration area showing the various types of species that can be used for windbreak plantings was created at Maumee State Forest in northwest Ohio.
- * Demo Area for Streamside Filter Strips - a demonstration streamside filter strip planting was completed in west-central Ohio. The tree planting was done along a highly-visible waterway and identified with a large sign.
- * Wills Creek Fencing Project - in cooperation with the local Soil and Water District, a special fencing practice was offered to landowners with grazed woodlands. This eastern Ohio area was identified by the Soil Conservation Service as a critical area for soil erosion.
- * Trees for Cleaner Streams Brochure - a brochure was developed explaining the benefits of trees in riparian areas. The brochure informs and promotes good management to private woodland owners throughout the state.
- * Stewardship Management Plan Folders - folders were developed to be used with each Forest Stewardship Management Plan prepared for private woodland owners. The folders add to the management plans and give landowners a nice reference document.

Moo..ve the Cattle Out of the Woods

The change in forest type, soil erosion, and the loss of timber value and wildlife habitat are real, long-term consequences of forest grazing. Excluding cattle is the most important step in controlling erosion and preventing further forest degradation. Afterward, forest management practices and stewardship will be needed to ensure healthy trees that generate high-quality forest products, maintain soil integrity, and protect other forest resources.



The old, open-grown oak pasture trees (background) provided the seed source for the younger oaks in the foreground. This two-aged stand is an example of what can develop in woodland /pastures when the livestock are removed and regeneration is successfully established.

grazed stands in Ohio were clearcut. The regenerated stands had a significantly greater economic potential than the old stands. Healthy commercial tree species now occupy these sites, and the duff layer is reforming. The major difficulty is that a regeneration cut is not aesthetically acceptable to many landowners. However, in many cases, a regeneration cut that admits abundant light to seedlings and sprouts is the best way to create a stand that accomplishes long-term landowner objectives and stimulates the creation of a duff layer. Adverse aesthetic impacts of a regeneration cut can be mitigated by using alternative practices such as group selection, deferred rotation, shelterwood method, or seed tree method. These practices also revitalize the forest floor, create new productive forest stands, and prevent future erosion from woodlands.

There is usually little difficulty securing abundant natural reproduction when cattle are excluded from woodlands that are still in the **early stage** of damage. It is safe to assume that in moderately damaged oak-hickory forests, regeneration in satisfactory amounts will establish in two to five years. But the percentage of reproduction will depend on the occurrence of good seed years, the amount of soil compaction, the severity of competition from grass, and whether the duff layer exists.

By the time a woodland has reached the **open park stage**, the duff layer on the forest floor is destroyed. Even in areas where cattle are excluded for a number of years, duff development may be lacking. These areas are highly compacted, the overstories are poorly stocked, and the terrains over 20 percent are not able to hold leaves and other organic materials in place. Materials and soil particles are constantly washed away with each rain event. This prevents the creation of a duff layer productive enough for seedlings to become established. Under the influence of management, time, climate conditions, and soil organisms, established vegetation begins to decompose and eventually a duff layer forms. Once evolved, the duff aids in the absorption of precipitation, moderation of runoff, and control of erosion and sedimentation. In time, a soil-holding understory develops.

In woodlands that have been previously grazed, the best way to develop a desirable duff layer is to create a new stand. This is especially true if there are no desirable trees in the stand. For example, previously



ANNOUNCEMENTS

New Wildlife Publication

NEW ENGLAND WILDLIFE: MANAGEMENT OF FORESTED HABITATS (GTR NE-144) by Richard DeGraaf, Mariko Yamasaki, William Leak, and John Lanier is hot off the press from the Northeastern Forest Experiment Station. It presents silvicultural treatments for six New England cover types: aspen-birch, northern hardwoods, swamp hardwoods, spruce-fir, hemlock, and oak-pine. In addition to silvicultural treatments to improve habitat for wildlife species, there is a good discussion of wildlife habitat relationships, inventory and prescription, and the practical aspects of wildlife management. There is also a section on nonforested habitats such as fields, orchards, and shrub swamps. There are matrices for species occurrence and utilization by forested and nonforested habitats, habitat breadth and size class, and structural habitat features for the 338 wildlife species in New England. The text is easy to read and there are excellent pictures to illustrate the habitat cover types. This is a must for anyone interested in wildlife management. Copies can be obtained from PUBLICATIONS GROUP, NORTHEASTERN FOREST EXPERIMENT STATION, FORESTRY SCIENCES LABORATORY, 359 MAIN ROAD, DELAWARE, OHIO 43015.

Accumulated Cumulative Tally Sheets

We have a generous supply of several cumulative and diagnostic tally sheets which have been inherited from Ken Lancaster and others over the years. These include:

CUMULATIVE VOLUME TALLY - BOARD FEET

CUMULATIVE VOLUME TALLY - ROUGH CORDS

ASPEN AND PINE CUMULATIVE VOLUME INTERNATIONAL TALLY SHEET

DIAGNOSTIC TALLY SHEET FOR NORTHERN HARDWOODS

DIAGNOSTIC TALLY SHEET FOR SUGARBUSH STANDS

DIAGNOSTIC TALLY SHEET FOR POLETIMBER AND SAWTIMBER STANDS
(for upland oaks and northern hardwoods)

These are all one-page forms. Diagnostic tally sheets have the stocking guides on the reverse side. If anyone needs a few hundred copies of any of these, please contact Neil Lamson, Silviculturist, USDA Forest Service, P.O. Box 640, Durham, NH 03824 (603) 868-5933.

There are several objectives that will enable the Forest Service and the State Foresters to achieve the goals of the national program. Each state should form a Natural Resource Conservation Education Committee, if one does not already exist. The Committee will be responsible for developing the state's Natural Resource Conservation Education Strategic Plan. The plan should clearly define goals and objectives for conservation education in the particular state. The Forest Service will coordinate a Natural Resource Conservation Education financial assistance program to be used to implement local projects.¹

One of the keys to a successful conservation education program is maintaining the local leadership that is happening right now, while at the same time, providing some national and regional coordination. We need to use existing Forest Service and State Forester networks to pass information along quickly to the local level.

Another network that could be expanded is the Project Learning Tree (PLT) network. PLT is an awarding-winning environmental education program which uses forest-based lesson plans and activities for grade levels K through 12. The activities are flexible enough to stand alone or to supplement existing curricula. PLT is a volunteer program that works in conjunction with local school districts and state agencies.² The concept has been expanded to Project Wild, which covers wildlife topics, and Project Aquatics, which addresses water resource issues.

Many states already have a conservation education program in place. Following are some examples:

Pennsylvania

In Pennsylvania, two bills, H.B. 2235 and S.B. 1444, would require the Department of Environmental Resources and Department of Education to develop and implement environmental education programs. The bills would dedicate 5 percent of the fines and penalties collected by the DER to administer the act and create an advisory council on environmental education.

School districts are currently mandated to teach a required number of hours of conservation education each week. Penn-Cambria School District, Cambria County, Pennsylvania, has already committed



Model woodlots provide the opportunity for students to relate classroom knowledge to real world forest situations. Franz Pogge of the U.S. Forest Service helps students see the beauty of nature in the woods around them.

funds for the development of an outdoor environmental learning center. The 70-acre center will supplement the classroom and act as a stimulus for students to learn more about the environment and their role within it. The center will also have a model woodlot with an environmental education trail. The woodlot will be used to demonstrate forest inventory and management, map and compass use, conservation, and gypsy moth suppression techniques. Study guide activity booklets and lesson plans will be developed for the education center.

The Pennsylvania Alliance for Environmental Education, a non-profit organization, conducts environmental education workshops for teachers throughout the year. It also provides the "Land and Soil" educational packet to schools.

WVCEC implements several worthwhile programs on an on-going basis, and has been doing so for 50 years. Each year, a Junior Conservation Camp is held at Cedar Lakes, in Ripley County, for children ages 11 to 14. In 1991, over 200 children participated in the camp. One of their projects was to build bluebird boxes. Each child is given a special camp T-shirt for participating in the program.

1991 marked the 50th anniversary of the Council's Conservation Camp. This very popular camp is held annually at Camp Caesar in Webster County. Twelve classes are taught to children from age 14-1/2 to 20. Instructors live in a cabin all week with nine participants in each cabin. Each participant receives a lapel pin upon completion of the camp.

Beginning in 1988, the West Virginia Conservation Education Council began holding a Teacher's Workshop in Beverly, WV. Teachers for grades kindergarten through 12 are taught four classes geared to hands-on techniques of environmental education. The theme for 1992 is "Aquatics," and classes will center around the Ohio River and Blennerhassett Island ecosystems. The 1992 Summer Teachers' Workshop was held August 10-14 at Wood County 4-H Camp in Mineral Wells.

WVCEC is involved in other conservation education projects. The Council sponsors "Project Samara," which consists of a junior-high level reference notebook about natural resources. After studying the materials, the student is given a test. Upon passing the test, the student is awarded a Samara pin. Members of the Council are active in training facilitators for "Project Learning Tree" and "Project Wild."



This student is sorting leaves and twigs to use in his forestry 4-H project. Learning to identify 10 trees and describing why they are important will increase this young man's understanding of the biological world.

The Council has also developed a Regional Resource Center in Pocahontas County. The center has literature on agriculture, soil science, forestry, entomology, plant pathology, and related subjects that teachers can use as a resource base.

The Council is currently writing the West Virginia Natural Resource Conservation Education State Strategic Plan. It explains the present state of conservation education, the council's goals and objectives, funding information, and how the plan will be evaluated for effectiveness.⁶

Presented here are only a few examples of conservation efforts being carried on in Pennsylvania, Minnesota and West Virginia. There are numerous resources and programs available in all 20 Northeastern Area States. We hope this information has whetted your appetite to get involved and find out what your state is doing in the area of conservation education. Now is the time to become active.

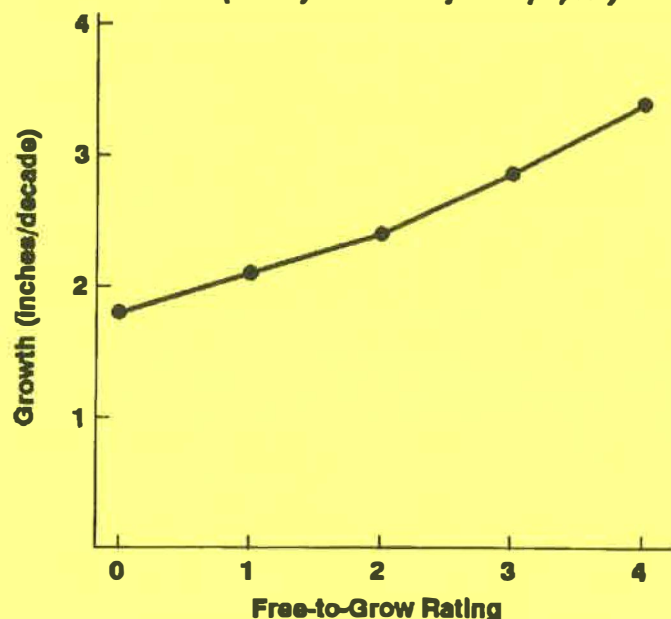
Managing Red Oak Crop Trees to Produce Financial Benefits

by Arlyn W. Perkey

During the first 15 years of my career, I was taught, and accepted, the premise that silvicultural decisions are made on a stand-level basis. In other words, if you inventoried a stand and found the appropriate prescription for the predominant portion was a clearcut, that prescription was applied to the whole stand. In some forest types and certain landownership categories, this was (and still is) appropriate. However, for high-value hardwood species like red oak, this strategy is now questionable. With red oak, like other hardwoods, all trees are not created equal. In most stands, there are only a limited number of trees that have the potential to produce high-value products. If the objective is to accumulate wealth and produce income, attention should focus on these potentially high-value trees. Decisions regarding management activities in the stand should emphasize these important trees -- the crop trees. Managing as few as five red oak pole or sawtimber crop trees on as few as 10 acres makes good financial sense.

Trees are not created equal with regard to their ability to produce non-timber benefits such as mast for wildlife and aesthetic beauty. Details on these topics are beyond the scope of this article, but it is important to be aware that non-financial considerations may help make the option of individual crop tree management a more attractive choice than area-wide, stand-level treatments.

Diameter Growth Rates of 20 Best Crop Trees/Acre (mostly red oak & yellow-poplar)



Data for this financial analysis are from a study conducted by the Northeastern Forest Experiment Station at the West Virginia University Forest near Morgantown, WV. Individual tree 8-year growth measurements were made in area-wide thinning plots established in 1982. In 1990, after eight growing seasons, selected individual tree remeasurements were made. The plots were originally thinned to 45 percent, 60 percent, and 75 percent stocking levels with no particular attention given to selection and release of individual trees. However, after five years of release, some individual tree crowns were evaluated to determine the number of sides of the crown released and to assign free-to-grow ratings (0 to 4, with 0 being none of the sides of the crown released, and 4 being all four sides released). Documentation proved (on the average) a tree's growth rate was positively related to its free-to-grow rating.

Figure 1. Relationship of 10-year diameter growth rates in inches/decade to free-to-grow rating for 20 best crop trees/acre.

Table 1. Red Oak Timber Crop Tree Rates-of-Return and Annual Income (4 percent Compound Rate for Precommercial Release for 5 Crop Trees/Acre on 10 Acres); Based on Ohio Stumpage Values and Northern West Virginia 1982-1990 Growth Rates.

	8-YEAR RATE-OF-RETURN	ANNUAL CROP TREE INCOME
SMALL SAWTIMBER (precommercial)	16.7 %	\$ 1.01
SMALL SAWTIMBER (commercial)	24.2 %	\$ 1.93
MEDIUM SAWTIMBER (commercial)	21.9 %	\$ 4.93

Future Financial Opportunities for Crop Trees in the Upper Midwest

Using 1991 estimated red oak stumpage values from the Upper Midwest, individual tree real rates-of-return and annual crop tree incomes were calculated for 10-year and 20-year periods. In other words, if you have 12.9 inches dbh small sawtimber trees or 16 inches dbh medium sawtimber trees, and current stumpage values remain constant, you could experience the following types of value increases. Using the previously mentioned per decade dbh growth rates, a 20-year period will provide sufficient time for released crop trees of this size to reach a realistic financial maturity.

Table 2. Red Oak Timber Crop Tree Rates-of-Return and Annual Income (4% Compound Rate for Precommercial Release), 5 Crop Trees/Acre on 10 Acres. \$100/MBF Stumpage for Small Sawtimber Trees, \$200/MBF for Medium Sawtimber Trees.

	RATE-OF-RETURN		ANNUAL CROP TREE INCOME	
	<u>10-YEAR</u>	<u>20-YEAR</u>	<u>10-YEAR</u>	<u>20-YEAR</u>
SMALL SAWTIMBER (precommercial)	13.4 %	10.4 %	\$ 1.66	\$ 2.05
SMALL SAWTIMBER (commercial)	16.6 %	11.5 %	\$ 2.40	\$ 2.60
MEDIUM SAWTIMBER (commercial)	6.2 %	5.9 %	\$ 2.42	\$ 3.18

These are favorable rates-of-return and annual crop tree incomes, but is it feasible to conduct subsequent harvest operations for as few as five trees/acre on 10 acres? Is that an operable volume? If the crop trees are grown to 20 inches dbh and have an average height of 1.5 logs, the volume is 1,200 BF/acre. On 10 acres, this would be 12,000 BF of high-value red oak sawtimber, which in areas that are reasonably well accessed, is an economically viable volume when red oak markets are strong. And, there is the added benefit of at least producing some income from the land during a period that would normally yield no return. If the stand were completely clearcut, there would be no timber income available for the subsequent 20-year period. With the crop tree management option, there would be some income in 20 years.

Notice the rate-of-return for these sizes of crop trees is still quite good, but the annual income per crop tree has dropped off significantly. Also note that twice as many saplings as poles were released per acre, resulting in a cost of release/tree that is half that of the pole-size crop trees. The smaller the residual crop trees, the more crop trees per acre you should have for the investment to be attractive.

Crop Tree Selection Criteria

The quality of crop trees varies from site to site, so it is difficult to draft standards that have universal application. A tree that would not qualify as a crop tree on a good site in an excellent stand, may be the best that is available on a poorer, mismanaged site. When selecting crop trees, it is often a matter of picking the best available. For each stand, crop tree selection criteria should be established to help judge which trees are the best and to verbalize minimum standards for crop trees in that stand. To increase financial benefits from managing timber crop trees, the selection criteria should focus on those characteristics that indicate the tree is likely to produce high-quality products and grow at a rapid rate. Some common timber crop tree selection criteria are as follows:

Red Oak Timber Crop Tree Selection Criteria

- Dominant/codominant trees — large, healthy crown relative to dbh
- High quality — potential butt log grade of 1 or 2, no epicormic branches or dormant buds on butt log
- Tree appears to have good life expectancy
- No high-risk trees — leaners, splitting forks, etc.
- Either stump sprouts or seedling origin stems are acceptable

When selecting red oak crop trees, it is important to look for indicators of the tree's probability of degrading in quality because of the development or growth of epicormic branches. Select timber crop trees with a dominant/codominant crown classification and few, if any, dead branches in the upper crown. Trees with healthy crowns that are large relative to their dbh are much less likely to develop



When selecting red oak crop trees, it is important to look for indicators of the tree's probability of degrading in quality due to the development or growth of epicormic branches.

epicormic branches than trees with small, skimpy crowns. Do not select trees with dormant buds or existing epicormic branches (alive or dead) on the butt log. They indicate further epicormic branching problems in the future.

If we do a good job selecting red oak timber crop trees and giving them a full crown-touching release, we can expect good growth results. However, we must remember that even on good sites, there is a critical growth factor we can't control—the weather. At the West Virginia University Forest, periodic red oak crop tree growth rates varied from 2.5 to 3.5 inches per decade. Correlating that growth with precipitation indicated that some of that variation was related to weather conditions.

and white pine, white ash, and scattered yellow birch and basswood. Productive loamy glacial till soils with a hardpan can be very good sites. Stumpage returns have paid for the lot a number of times over as well as ASCS cost-sharing assistance. We have detailed financial records which lead us to conclusions that almost mandate intensive forest management, especially in the present state of land prices, taxes, and associated costs.

We started a growth study in 1983 with 10 tenth-acre circular permanent plots, but soon progressed to the concept of individual study trees. We selected over 250 dominant or codominant quality trees and marked a horizontal measurement line and a number with spray paint on each tree. We remeasure every year to the nearest 0.1 inch. We also record species and number of potential 8-foot veneer logs. The data is helping us evaluate tree value and growth, since we know the age of every stand by stump aging when we operate there. We prefer this to increment boring for many reasons, and feel it is a very useful technique, especially when these trees can be worth several hundreds of dollars, roadside, when they are mature. We would like to keep track of every high grade crop tree on the lot if time permits. Five year data is nice, but yearly data is much more sensitive to changes and may find problems before we see the mortality and lose valuable trees. A veneer and sawlog white birch is worth very little as dead firewood and less as pulpwood.

As we have prepared areas for regeneration by cutting all the "puckerbrush" (saplings from 1-3 inches--too small to make firewood, but not suited as future crop trees--and in the way of regeneration) and felling and yarding the harvestable wood, the areas have reverted to dense thickets of beech suckers, maple sprouts, and striped maple seedlings. The only other trees present are too small to be competitive in the stand. We have gone over several areas with a chainsaw and brush loppers, removing the competing beech and red maple and pulling up the weakly-rooted striped maple. Much of the beech and red maple return with renewed vigor. However, we do have 7-year-old stands of 40-50 thousand seedlings per acre with oak, ash, birch, red spruce, and white pine at 2-8 foot intervals on a consistent basis--the makings of some potentially interesting and valuable stands. Our next step has been to graduate to herbicides to convert and regenerate the untouched regeneration areas that have been "lost" to any economic return. This entails felling the brush and treating the stumps with a spray of 25% Roundup and water from a spray bottle. The time to start this treatment really is when the area is cut, so we treat the unmerchantable small stumps before we get ready to cut a hitch of wood, and then after cutting the hitch spray the lower stumps in the course of hooking up our chokers. This takes less time and spray material than anything else we have tried. Results seem good so far; better than with lesser concentrations. We may use Garlon if the red maple recovers from what we have done with Roundup.

We have drawn some financial conclusions from all this work and observation. Our "moving-target" management objective is a stand of high-quality saw and veneer log trees, with 1-1/2 logs, and 200-250 board feet at 18-20 inches in diameter. A 20x20 spacing shows up in natural stands for a dominant with crown touching its neighbors. We believe that 18-20 inches is possible on good sites at 60-80 years of age under a thinning regimen that aims for 25-30 feet of clear bole with pruning where needed and thins when the crowns touch and growth slows up. We prefer this approach rather than basal area levels and J-curve distributions. It's doing what the crop trees need to keep in high gear. Time will tell whether diameters will better this goal. The study tree measurements will tell us what trees are actually doing. We want to follow each tree as well as we can (250 board feet at \$600 MBF, roadside, and we already have higher prices here for certain hardwood veneer grades, allows \$100 MBF for harvesting and the balance belongs in stumpage). These trees are worth \$125 to us on the stump; well worth the half-hour of management time per tree that we think is generous during its lifetime. That is an excellent return for the land and our time, and we think that it makes a consideration of intensive forest management along these lines most worthwhile.

Our Sweet Lot also has pileated woodpeckers in elm and hemlock snags, flying squirrels as well as reds and grays, our beloved blue jays who help spread and plant our red oaks, and brook trout and mink in Kidder Brook that winds through a steep ravine on the lot, as well as partridge and ever-present deer (who browse our oak and ash leaders). There is also a view of Mt. Katahdin on the skyline some 90 miles to the north when the sky is clear. The oak and spruce regeneration, however, means to fill that space in a few years.